CLAIM AMENDMENTS

Claims 1-2 **(Cancelled)**

Claim 3. **(Currently Amended)** An isolated nucleic acid which hybridizes under stringent conditions to a nucleotide sequence designated in SEQ. ID. NO. 5, wherein said nucleotide sequence encodes a polypeptide sequence or fragment thereof that comprises at least one catalytic domain of histone deacetylase 6 (HDAC6) or has HDAC6 activity.

Claims 4-12 **(Cancelled)**

Claim 13. **(Currently Amended)** An isolated nucleic acid encoding an ~~*HDx*~~ HDAC6 polypeptide~~, which *HDx* polypeptide comprises a polypeptide sequence~~ having at least ~~88% identical~~ 85% homology with SEQ. ID. N~~o~~O. 6, ~~or a fragment thereof~~ wherein said polypeptide sequence or fragment thereof comprises at least one catalytic domain of histone deacetylase 6 (HDAC6) or has HDAC6 activity.

Claim 14. **(Currently Amended)** An isolated nucleic acid encoding an ~~*HDx*~~ HDAC6 polypeptide~~, which *HDx* polypeptide comprises a polypeptide sequence~~ having at least ~~95% identical~~ 95% homology with SEQ. ID. N~~o~~O. 6, ~~or a fragment thereof~~ wherein said polypeptide sequence or fragment thereof comprises at least one catalytic domain of histone deacetylase 6 (HDAC6) or has HDAC6 activity.

Claim 17. **(Currently Amended)** An isolated nucleic acid encoding an ~~*HDx*~~ HDAC6 polypeptide, ~~which~~ ~~*HDx*~~ wherein said polypeptide ~~comprises a~~ has the ~~polypeptide~~ sequence ~~designated in~~ of SEQ. ID. N~~o~~O. 6.

Claim 18. **(Currently Amended)** The nucleic acid of claims ~~15, 16~~, or 17, which ~~*HDx*~~ HDAC6 polypeptide has a molecular weight in the range of ~~40kD to 90KD~~ 131 kD to 208 kD.

Claim 19. **(Currently Amended)** The nucleic acid of any one of claims ~~4, 5, 6, 7, 8, 9, 10, 11, 12,~~ 13, 14, ~~15, 16~~ or 17, ~~which *HDx*~~ wherein said HDAC6 polypeptide is a fusion protein further

comprising, in addition to ~~*HDx*~~ an HDAC6 polypeptide sequences, a second polypeptide sequence having an amino acid sequence unrelated to a nucleic acid sequence.

Claim 20. **(Original)** The nucleic acid of claim 19, wherein said fusion protein includes, as a second polypeptide sequence, a polypeptide which functions as a detectable label for detecting the presence of said fusion protein or as a matrix-binding domain for immobilizing said fusion protein.

Claim 21. **(Currently Amended)** The nucleic acid of any one of claims ~~4, 5, 6, 7, 8, 9, 10, 11, 12,~~ 13, 14, ~~15, 16,~~ or 17, further comprising a transcriptional regulatory sequence operably linked to said nucleotide sequence so as to render said nucleic acid suitable for use as an expression vector.

Claim 22. **(Original)** An expression vector, capable of replicating in at least one of a prokaryotic cell and eukaryotic cell, comprising the nucleic acid of claim 21

Claim 23. **(Original)** A host cell transfected with the expression vector of claim 22 and expressing said recombinant polypeptide.

Claim 24. **(Currently Amended)** A method of producing a recombinant ~~*HDx*~~ HDAC6 polypeptide comprising culturing the cell of claim 23 in a cell culture medium to express said recombinant polypeptide and isolating said recombinant polypeptide from said cell culture.

Claims 25-26 **(Cancelled)**

Claim 27. **(Currently Amended)** A recombinant transfection system comprising:

(i) a gene construct including the nucleic acid represented in ~~any one of~~ SEQ. ID. Nos. ~~1, 3, or~~ 5 and operably linked to a transcriptional regulatory sequence for causing expression of said ~~*HDx*~~ HDAC6 polypeptide in eukaryotic cells, and

(ii) a gene delivery composition for delivering said gene construct to a cell and causing the cell to be transfected with said gene construct.

Claim 28. **(Original)** The recombinant transfection system of claim 27, wherein the gene delivery composition is selected from the group consisting of a recombinant viral particle, a liposome, and a polycationic nucleic acid binding agent.

Claims 29-77 **(Cancelled)**

Claim 78. **(New)** An isolated nucleic acid encoding a histone deacetylase 6 (HDAC6) polypeptide which comprises a polypeptide sequence having at least 95% homology with SEQ ID NO: 10, or a polypeptide sequence comprising at least one catalytic domain of HDAC6.

Claim 79. **(New)** An isolated nucleic acid encoding a histone deacetylase 6 (HDAC6) polypeptide which comprises a polypeptide sequence having at least 95% homology with SEQ ID NO: 74, or a polypeptide sequence comprising at least one catalytic domain of HDAC6.

Claim 80. **(New)** The isolated nucleic acid of claim 13, wherein said nucleic acid encodes an HDAC6 polypeptide having at least two-fold deacetylation activity above background levels as quantified by scintillation counting of the release of [^{3}H]-acetate from [^{3}H] acetate-incorporated histones in a histone deacetylase assay.

Claim 81. **(New)** The isolated nucleic acid of claim 13, wherein said nucleic acid encodes an HDAC6 polypeptide having at least three-fold deacetylation activity above background levels as quantified by scintillation counting of the release of [^{3}H]-acetate from [^{3}H] acetate-incorporated histones in a histone deacetylase assay.

Claim 82. **(New)**The isolated nucleic acid of claim 13, wherein said nucleic acid encodes an HDAC6 polypeptide having deacetylase activity for histone H2A, histone H2B, histone H3 or histone H4 as determined by a histone decetylase assay.

Claim 83. **(New)** The isolated nucleic acid of claim 13, wherein said nucleic acid encodes an HDAC6 polypeptide having histone deacetylase activity that is sensitive to incubation with 300 nM trichostatin for 10 minutes.

Claim 84. **(New)** The isolated nucleic acid of claim 13, wherein said nucleic acid encodes an HDAC6 polypeptide having histone deacetylase activity that is insensitive to treatment with any cyclic tetrapeptide inhibitors of histone deacetylases.

Claim 85. **(New)** An isolated nucleic acid encoding a HDAC6 polypeptide-having at least 99% homology with SEQ. ID. NO. 6, wherein said polypeptide sequence comprises at least one catalytic domain of HDAC6, or has HDAC6 activity.